

1. Method for controlling the temperature of at least one catalyst arranged in an exhaust gas cleaning system (12) of a lean-runnable multi-cylinder engine (10), wherein energy is introduced into the exhaust gas cleaning system (12) by a lambda split, and the introduction of energy is limited depending on

(a) at least one of the parameters catalyst temperature, exhaust gas temperature and exhaust gas mass flow rate and/or

(b) at least one of the parameters change of the catalyst temperature, change of the exhaust gas temperature and change of the exhaust gas mass flow rate,

characterized in that

the introduction of energy is limited in addition depending on

(c) at least one of the parameters rate of change of the catalyst temperature, rate of change of the exhaust gas temperature and rate of change of the exhaust gas mass flow rate.

2. Method according to claim 1, characterized in that the exhaust gas cleaning system (12) includes at least two exhaust gas paths (16, 16') disposed between the multi-cylinder engine (10) and the at least one catalyst, wherein a predefinable lambda value can be applied to each of the at least two exhaust gas paths.

3. Method according to claim 1 or 2, characterized in that the exhaust gas cleaning system (12) has at least one main catalyst (24) with at least two upstream pre-catalysts (18, 18'), wherein each pre-catalyst (18, 18') is arranged in a corresponding exhaust gas path (16, 16') to which a predefinable lambda value can be applied.

4. Method according to one of the claims 1 to 3, characterized in that the introduction of energy is limited with increasing, measured or modeled temperature of the at least one catalyst, in particular the main catalyst (24).

5. Method according to one of the claims 1 to 4, characterized in that the introduction of energy in at least one catalyst, in particular in the main catalyst (24), is limited for a high positive time-dependent temperature gradient.

6. Method according to one of the claims 1 to 5, characterized in that the introduction of energy in at least one catalyst, in particular in the main catalyst (24), is limited when a positive time-dependent temperature gradient progressively increases.

7. Method according to one of the claims 1 to 6, characterized in that the introduction of energy is limited when the exhaust gas mass flow decreases.

8. Method according to one of the claims 1 to 7, characterized in that the amount of the introduced energy is defined by a split factor, which is determined when introduction of energy is requested, with the split factor defining the lambda values of the individual exhaust gas paths (16, 16') in the exhaust gas cleaning device (12).

9. Method according to claim 8, characterized in that when the lambda value before the at least one catalyst, in particular the main catalyst (24), is controlled to a desired value, the lambda value in the lean exhaust gas path (16') is controlled to the lean lambda value, which results from the required split factor, depending on the lambda value measured before and after the at least one catalyst, in particular the main catalyst (24), whereas the rich exhaust gas path (16) is pre-controlled.

10. Method according to claim 8 or 9, characterized in that with a very lean setting on the lean exhaust gas path (16'), either an at least temporary enrichment of the entire mixture is permitted, if the pre-control of the rich exhaust gas path (16) is not modified accordingly, or the rich exhaust gas path (16) is pre-controlled to lean lambda values, wherein the split factor is optionally reduced and/or less energy is introduced.

11. Method according to claim 8 or 9, characterized in that with a lambda value > 1.3 in the lean exhaust gas path (16'), either at least a temporary enrichment of the entire mixture is permitted, if the pre-control of the rich exhaust gas path (16) is not modified accordingly, or the rich exhaust gas path (16) is pre-controlled to lean lambda values, wherein optionally the split factor is reduced and/or less energy is introduced.

12. Method according to claim 8 or 9, characterized in that with a lambda value > 1.45 in the lean exhaust gas path (16'), either an at least temporary enrichment of the entire mixture is permitted, if the pre-control of the rich exhaust gas path (16) is not modified accordingly, or the rich exhaust gas path (16) is pre-controlled to lean lambda values, wherein optionally the split factor is reduced and/or less energy is introduced.

13. Method according to one of the claims 1 to 12, characterized in that the at least one catalyst, in particular the main catalyst (24), is a NO_x-storage catalyst, whose temperature is controlled by introduction of energy into the exhaust gas cleaning system so that the NO_x-storage catalyst is desulfurized.

14. Method according to one of the claims 1 to 13, characterized in that the introduction of energy is limited depending on the catalyst temperature, the time-dependent change of the catalyst temperature and the rate of change of the catalyst temperature and of the exhaust gas mass flow.

15. Lean-runnable multicylinder engine (10) with an exhaust gas cleaning system (12) capable of lambda-spitting, with at least one catalyst arranged in the exhaust gas cleaning system (12), wherein the multicylinder engine (10) includes means for controlling the temperature of the at least one catalyst, wherein the means introduce energy into the exhaust gas cleaning system (12) by way of a lambda split by influencing at least one operating parameter of the multicylinder engine (10), and wherein the introduction of energy is limited depending on

- (a) at least one of the parameters catalyst temperature, exhaust gas temperature and exhaust gas mass flow rate and/or
- (b) at least one of the parameters change of the catalyst temperature, change of the exhaust gas temperature and change of the exhaust gas mass flow rate, and in addition
- (c) at least one of the parameters rate of change of the catalyst temperature, rate of change of the exhaust gas temperature and rate of change of the exhaust gas mass flow rate.

16. Multicylinder engine according to claim 15, characterized in that the exhaust gas cleaning system (12) includes at least two exhaust gas paths (16, 16') disposed between the multi-cylinder engine (10) and the at least one catalyst, wherein a predefinable lambda value can be applied to each of the at least two exhaust gas paths.

17. Multicylinder engine according to claim 15 or 16, characterized in that the exhaust gas cleaning system (12) has at least one main catalyst (24) with at least two upstream pre-catalysts (18, 18'), wherein each pre-catalyst (18, 18') is arranged in a corresponding exhaust gas path (16, 16'), to which a predefinable lambda value can be applied.

18. Multicylinder engine according to one of the claims 15 to 17, characterized in that the at least one catalyst and/or the main catalyst (24) is a NO_x-storage catalyst.

19. Multicylinder engine according to one of the claims 15 to 18, characterized in that the precious metal content of the at least two pre-catalysts (18, 18') is ≤ 3.59 g/dm³, in particular ≤ 2.87 g/dm³.

20. Multicylinder engine according to one of the claims 15 to 19, characterized in that the means comprise a control device, in which models and algorithms for a coordinated control of exhaust-gas-related and performance-related measures are stored in digitized form.

21. Multicylinder engine according to one of the claims 15 to 20, characterized in that the multicylinder engine (10) is a gasoline engine, in particular a direct-injection gasoline engine, or a diesel engine.